

all the main experimental points of the investigation ; and, upon the whole, I can perceive nothing substantiated which is positively *irreconcilable* with the principle of interference ; while the new modifications of the phenomena here presented, so far as general considerations can be relied on, seem sufficiently conformable to the undulatory theory ; but as to their more *exact* quantitative explanation, no definitive opinion can be pronounced until certain analytical investigations of great length and complexity shall have been gone through ; by which alone theory can be brought into exact and satisfactory comparison with experiment.

2. "On the Lunar Atmospheric Tide at Singapore." By Captain C. M. Elliot, M.E., F.R.S. Received Dec. 18, 1851.

The discussion of the barometric observations at St. Helena by Colonel Sabine having clearly and decidedly shown the moon's influence on the atmosphere, the author determined to discuss in a similar manner the barometric observations at Singapore. The results of this discussion are given in the present communication.

In order that a comparison might be made between the results at Singapore and at St. Helena, he copied to a considerable extent the form of the different lunar tables drawn up by Colonel Sabine in his paper published in the Philosophical Transactions.

The observatory at Singapore was in latitude $1^{\circ} 18' 32''$ N. and longitude $103^{\circ} 56' 30''$ E. of Greenwich. The cistern of the barometer, one of Newman's, having a tube 0.532 inch in diameter, was a few feet above high-water mark. The observations, during the whole of 1841 and the early part of 1842 and that of 1843, were made at every two hours ; during the remainder of the time, to the close of 1845, at every hour.

The diurnal variation of the barometer having been eliminated, by deducting the mean monthly height at each hour, from the height given by observation, the residual quantities were arranged in tables ; and the observation corresponding the nearest in time to the moon's superior culmination for each day being marked as 0 hour of lunar time, the whole were again rearranged in tables according to lunar hours. The variation or range of the mean of the sums of the differences thus arranged is exhibited in a table, in the last column of which are given the means of all the hours for each period of six months. In a second table are given the differences between these mean results in the last column of the preceding table and the numbers corresponding to the several hours in the other columns.

The means of the complete years of observation, 1841, 1844, 1845, are shown in a third table, in which are also given the means of the first six months of 1842 and 1843, during which two-hourly observations were made, and the means of the latter halves of these years, during which the observations were made hourly.

The means of the twenty-four months of the two-hourly observations, and of the thirty-six months of the hourly observations, are given in Table IV. Finally, Table V. exhibits the results of the observations of three years, so combined as to show the effect on

the barometer, of the moon when similarly situated with reference both to its superior and inferior passage. In a column of this table are given the results of two years' observations at St. Helena, extracted from Colonel Sabine's paper. From a comparison, it appears that the effect produced by the moon on the barometer at Singapore, nearly on the equator, is slightly greater than at St. Helena, more distant from it by $14\frac{1}{2}^{\circ}$ of latitude.

March 18, 1852.

COLONEL SABINE, R.A., V.P. and Treas., in the Chair.

A paper was read, entitled, "On the Blood-proper and Chylo-aqueous Fluid of Invertebrate Animals." By Thomas Williams, M.D. Communicated by Thomas Bell, Esq., Sec. R.S. &c. Received Dec. 18, 1851.

In this paper the author has accumulated numerous observations, founded upon dissection and microscopic inquiry, to prove that there exist in *invertebrate animals* two distinct kinds of nutrient fluids; that in some classes of this sub-kingdom these two fluids coexist in the same organism, though contained in distinct systems of conduits, while in others they become united into one. The author proposes to distinguish these two orders of fluids under the denominations of the *blood-proper* and *chylo-aqueous fluid*. The former is always contained in definitively organized (walled) blood-vessels, and having a determinate circulatory movement; the latter, with equal constancy, in chambers and irregular cavities and cells, communicating invariably with the peritoneal space, having not a determinate circulation, but a to-and-fro movement, maintained by muscular and ciliary agency. He then adduces evidence, derived from dissection, in proof of the statement that the system of the blood-proper does not exist under any form, the most rudimentary, below the Echinodermata; that, in other words, the system of the true blood, or of the blood-proper, begins at the Echinodermata. The author then shows that below the Echinodermata, namely in the families of Polypes and Acalephæ, the digestive and circulatory systems are identified, and that consequently the external medium is admitted directly into the nutrient fluids. He considers that this circumstance constitutes a fundamental distinction between the chylo-aqueous system and that of the blood-proper, into which, under no conditions, is the external inorganic element directly introduced.

He conceives that his observations suffice to establish the law, with reference to the chylo-aqueous fluid, that in every class in which it exists, it is charged more or less abundantly with *organized corpuscles*. This is an invariable fact in the history of this fluid. His inquiries show that these corpuscles are marked by distinctive microscopic characters, not in different classes and genera only, but